Remarks

Reconsideration of this Application is respectfully requested.

Upon entry of the foregoing amendment, claims 1-64 are pending in the application, with claims 1, 28, 33 and 60 being the independent claims. Claim 14 has been amended to correct a typographical error. A minor amendment has also been made to the specification to remove unnecessary attorney docket number information from the paragraph entitled "Cross-Reference to Related Applications." These changes are believed to introduce no new matter, and their entry is respectfully requested.

Based on the above amendment and the following remarks, Applicant respectfully requests that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Allowable Subject Matter

Applicants gratefully acknowledge the Examiner's continued indication that claims 60-64 are allowable over the prior art of record.

Rejections under 35 U.S.C. § 102

The Examiner has maintained his rejection of claims 1-8 and 28-40 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,487,086 to Bhaskar ("Bhaskar"). The bases for the Examiner's rejection of these claims are identical to those set forth in the first Office Action mailed on August 25, 2004, except that the Examiner has provided additional detail concerning why he believes the step of "combining the

residual signal with a first noise feedback signal to produce a predictive quantizer input signal", as recited in claim 1, is taught by Bhaskar.

Applicant respectfully submits that the Examiner has fundamentally misunderstood the teachings of Bhaskar. As will be described in more detail below, Bhaskar fails to teach or suggest the relevant limitation for at least the following reasons: (1) Bhaskar teaches an "open loop" speech codec that is specifically designed to avoid the use of a noise feedback loop and noise feedback signal, and (2) despite the Examiner's assertions to the contrary, there is simply no structure in Bhaskar's speech codec that performs the function of providing a noise feedback signal.

1. Bhaskar Teaches An "Open Loop" Speech Coder That Avoids the Use of a Noise Feedback Signal

In the Background section of Bhaskar, a conventional adaptive predictive codec is described that includes a noise feedback loop. In particular, in accordance with FIG. 1 of Bhaskar, a residual signal is "quantized inside a feedback loop which filters the quantization noise through a noise shaping filter 1 and sums the result using adder 2 with the residual to form the quantizer input." *See* Bhaskar, col. 2, ll. 40-44 and FIG. 1.[1] Having described a conventional codec that includes a noise feedback loop, Bhaskar goes on to state why such a configuration should not be used:

> There are two main disadvantages to the [Noise Feedback Quantization] scheme. First, due to the noise feedback, the variance of the quantizer input signal is higher than the variance of the residual. This is especially true due to the low rate of quantization. As a result, the performance of

[1] In the present application, Applicant has also acknowledged that the use of a noise feedback loop in a codec was known in the art. *See, e.g.*, Specification at p. 15, l. 10- p. 17, l. 21, FIG. 1 (describing a "conventional noise feedback coding structure or codec"). However, for reasons fully set forth in the present specification, the inventions recited in claims 1-64 are patentably distinct from such conventional implementations.

> the quantizer, referenced to the residual variance will be reduced. Secondly, and more significantly, the feedback loop may become unstable if the power gain through the feedback filter becomes large. This can occur during signals of large spectral dynamic range such as sinusoids and resonant voiced sounds. Controlling the stability by limiting the power gain usually results in a loss in the overall performance of the codec.

See Bhaskar, col. 2, ll. 56-67.

Having stated that the conventional noise feedback loop configuration of FIG. 1 leads to an increase in the variance of the residual and instability, Bhaskar then describes an alternative "open loop" approach, referred to as "Transform Domain Vector Quantization" (TVQ), that avoids these issues:

> The proposed invention addresses the residual quantization aspect of predictive coding. In TVQ, the residual signal is transformed into a transform domain. In the transform domain, ***quantization and spectral shaping are implemented as open loop operations***. Consequently, the problem of instability does not arise. For the same reason, increase in the variance of the residual is also not encountered.

See Bhaskar, col. 3, ll. 43-49 (emphasis added). This approach, which is embodied in FIGS. 2 and 3 of Bhaskar, is referred to as "open loop" because it does not include a noise feedback loop or use a noise feedback signal.

In view of the foregoing, it is clear that the Examiner's assertion that FIG. 2 of Bhaskar teaches "combining the residual signal with a first noise feedback signal to produce a predictive quantizer input signal" is unfounded. As outlined above, the codec depicted in FIG. 2 of Bhaskar is an "open loop" codec specifically designed to avoid the use of a noise feedback loop or noise feedback signal.

2. There is no Structure in Bhaskar's Speech Codec that Performs the Function of Providing a Noise Feedback Signal

Furthermore, none of the structures in FIG. 2 identified by the Examiner as performing the step of "combining the residual signal with a first noise feedback signal

to produce a predictive quantizer input signal" actually perform that step, either alone or in combination with each other. Each of these structures will now be addressed in turn.

FIG. 2, subblock 24: The Examiner has asserted that this structure combines a residual "with the quantized parameters to produce a predictive quantizer residual . . . along with the associated noise". *See* Office Action at p. 3. Subblock 24 performs no such function. Subblock 24 is a Discrete Cosine Transform (DCT) circuit that operates only to receive a residual signal and transform it from the time domain to the frequency domain. *See* Bhaskar, col. 3, ll. 25-28, col. 4, ll. 48-63. Thus, subblock 24 does not receive or operate on any "quantized parameters" or "associated noise" as asserted by the Examiner.

FIG. 2, subblock 23: The Examiner has further asserted that subblock 23 of FIG. 2 "teaches noise masking in the calculation of the noise coefficient." *See* Office Action, at p. 3. As an initial matter, this statement is incorrect—the only structure in Bhaskar that uses a noise masking parameter is quantizer circuit 28, which uses a fixed noise masking parameter ß (typically ranging from 0.7 to 0.9) as a weighting factor in selecting an optimal quantization codevector. *See* Bhaskar, col. 6, ll. 50-55. However, the use of a fixed noise masking parameter in this fashion bears no relation to "combining the residual signal with a first noise feedback signal to produce a predictive quantizer input signal" as recited in independent claim 1. For example, the fixed noise masking parameter is not a signal and it is not "fed back" from any other portion of the codec depicted in FIGS. 2 and 3 of Bhaskar.

FIG. 2, subblocks 25, 26 and 28: The Examiner has also asserted that subblocks 25 and 26 teach "using an improved 'noise feedback' for the power spectral calculations

based on the short term and long term parameters . . . and noise shaping in subblock 28." Contrary to the Examiner's assertion, Bhaskar merely teaches that circuit 26 supplies an estimate of the input signal power to circuit 25 so that circuit 25 can perform equations relating to how transform coefficients are grouped into vectors for vector quantization. These equations are performed to ensure "that all vectors have the same entropy, and hence can be quantized using the same number of bits." *See* Bhaskar, col. 5, ll. 47-49. The short and long term prediction parameters associated with short term predictor 21 and long term predictor 22 are used to derive the necessary equations. However, the use of prediction parameters in this fashion has nothing to do with "combining the residual signal with a first noise feedback signal to produce a predictive quantizer input signal" as recited in independent claim 1. For example, the short and long term prediction parameters are not noise signals and they are not "fed back." Furthermore, as noted above, the use of a predefined noise masking parameter ß by quantizer circuit 28 also bears no relation to this limitation.

3. Conclusion

As described above, Bhaskar teaches an "open loop" codec structure that is specifically designed to avoid the use of a noise feedback loop or noise feedback signal. Moreover, none of the structures described in Bhaskar's codec, alone or in combination with each other, perform the step of "combining the residual signal with a first noise feedback signal to produce a predictive quantizer input signal" as recited in independent claim 1. Since Bhaskar does not teach or suggest each and every limitation of claim 1, it cannot anticipate that claim. Dependent claims 2-8 are also not anticipated by Bhaskar for at least the same reasons as independent claim 1 from which they depend and further

in view of their own respective features. Accordingly, the Examiner's rejection of claims 1-8 as anticipated by Bhaskar are traversed and Applicant respectfully requests that these rejections be reconsidered and withdrawn.

Independent claim 28 includes the steps of "combining the short-term and long-term predicted speech signal with the speech signal to produce a residual signal" and "combining the residual signal with a noise feedback signal to produce a quantizer input signal". Bhaskar does not teach or suggest at least each of these features of claim 28. For example, as explained above in reference to claim 1, FIG. 2 of Bhaskar does not teach or suggest the use of a noise feedback loop or noise feedback signal. Since Bhaskar does not teach or suggest each and every limitation of claim 28, it cannot anticipate that claim. Dependent claims 29-32 are also not anticipated by Bhaskar for at least the same reasons as independent claim 28 from which they depend and further in view of their own respective features. Accordingly, the Examiner's rejection of claims 28-32 as anticipated by Bhaskar are traversed and Applicant respectfully requests that these rejections be reconsidered and withdrawn.

Independent claim 33 recites "a first combiner adapted to combine the residual signal with a first noise feedback signal to produce a predictive quantizer input signal." Bhaskar does not teach or suggest at least this feature of claim 33. For example, as explained above in reference to claim 1, FIG. 2 of Bhaskar does not teach or suggest the use of a noise feedback loop or noise feedback signal. Since Bhaskar does not teach or suggest each and every limitation of claim 33, it cannot anticipate that claim. Dependent claims 34-40 are also not anticipated by Bhaskar for at least the same reasons as independent claim 33 from which they depend and further in view of their own

respective features. Accordingly, the Examiner's rejection of claims 33-40 as anticipated by Bhaskar are traversed and Applicant respectfully requests that these rejections be reconsidered and withdrawn.

Other Matters

The Examiner has objected to claims 9-27 and 41-59 as being dependent upon a rejected base claim. Based on the foregoing remarks, Applicant has traversed the rejection of the base claims upon which these claims depend. Accordingly, Applicant respectfully requests that these objections be reconsidered and withdrawn.

Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicant believes that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

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